Special Case Hazards (Hg, PCB, Li, Pb, and Asbestos)

A-4J-0020

ASO-9

September 2, 2016

EOs

- **EO #09-1 IDENTIFY the various elements of the Mercury Control Program, and the PCB and lithium battery safety programs**
- **EO #09-2 DEFINE the duties and responsibilities of the Safety Officer within the Mercury Control, PCB, and lithium battery safety programs**
- **EO #09-3 DESCRIBE the areas aboard ship where you can find mercury, PCB's, and lithium battery hazards**
- **EO #09-4 IDENTIFY the various elements of the Hazardous Material Control Program**

EOs

- **EO #09-5 DEFINE the duties and responsibilities of the Safety Officer within the Hazardous Material Control Program**
- **EO#09-6 DESCRIBE hazardous material spill response procedures**
- **EO #09-7 IDENTIFY the various elements of the Asbestos Control Program**
- **EO #09-8 DEFINE the duties and responsibilities of the Safety Officer within the Asbestos Control Program**

References

- Mercury
  - OPNAVINST 5100.19E; CH B3-B
- PCB
  - NAVSEA S9593-A1-MAN-010 -Shipboard Management Guide for Polychlorinated Biphenyls (PCB)
  - NAVSEA Advisories 94-1 and 94-2
- LITHIUM BATTERY
  - NAVSEA S9310-AQ-SAF-010 - Batteries, Navy Lithium Safety Program responsibilities and procedures
- OPNAVINST 5090.1C – Environmental and Natural Resources Program Manual
- NSTM 635 (Thermal, Fire, and Acoustical Insulation)

Mercury Hazards

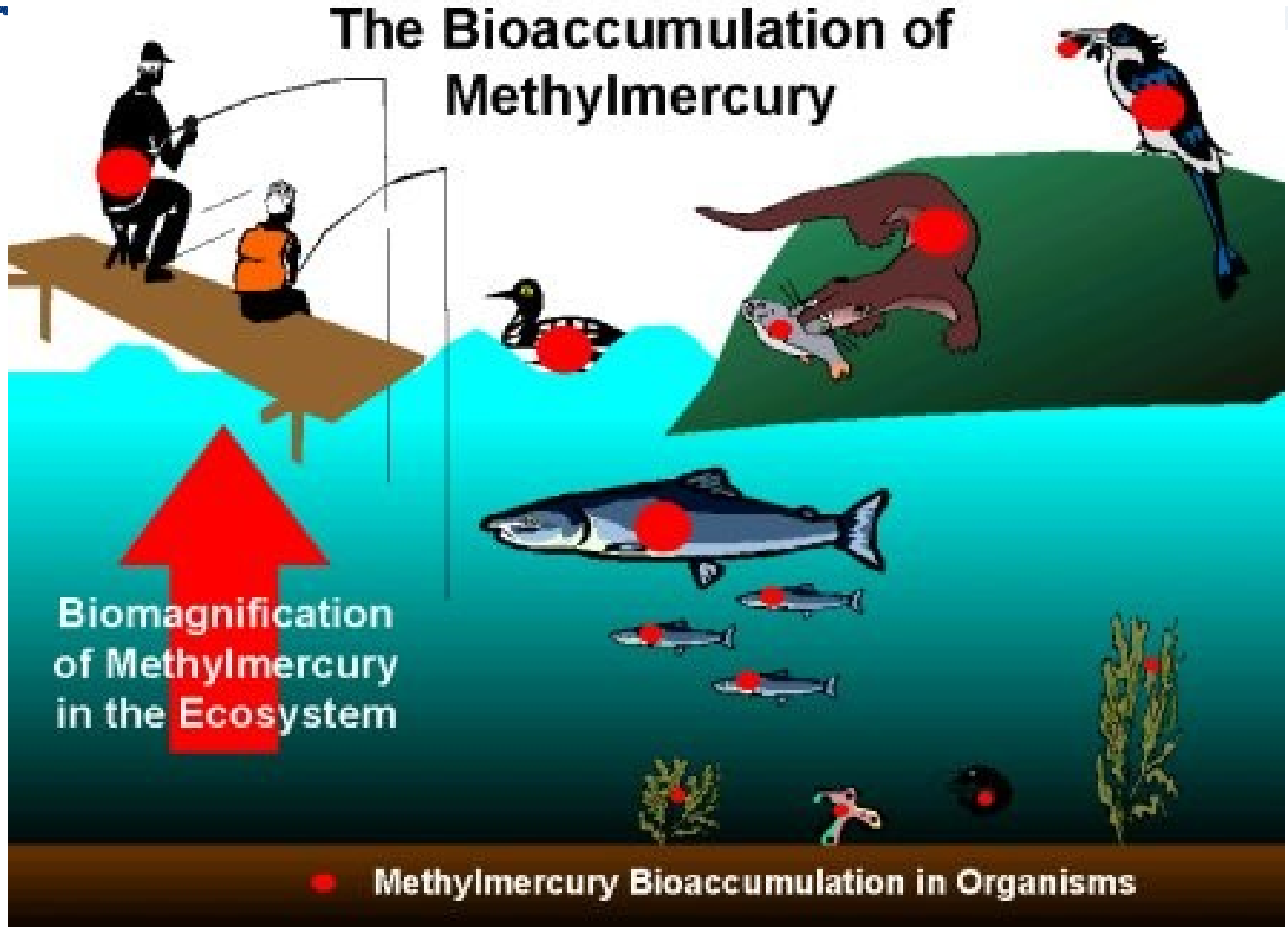
- Potential grave health hazard if
  - Ingested
  - Absorbed through skin
  - Inhaled
- Can vaporize at room temperature in amounts hazardous to health
- Inorganic Hg PEL 0.05 mg/m^3

Mercury Sources

- Fluorescent lamps
- Dental amalgams
- Batteries
- Electronic relays and switches
- Boiler chemicals

Idiots and Mercury

Environmental Contamination

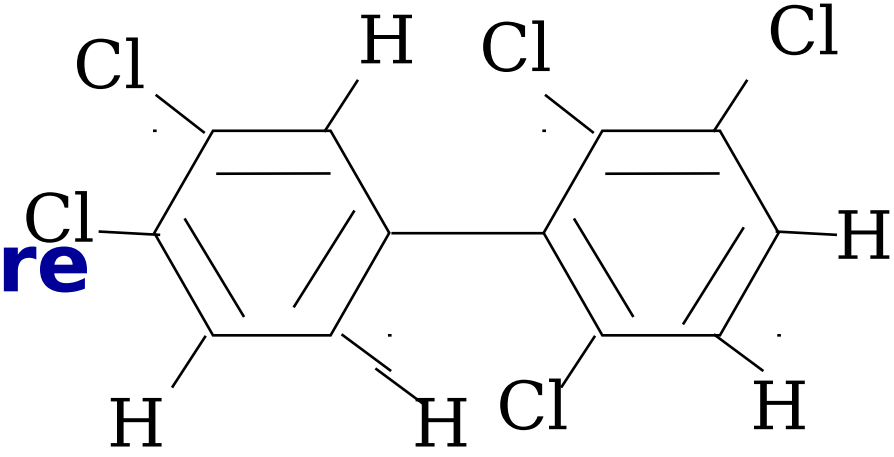

The Bioaccumulation of Methylmercury
Biomagnification of Methylmercury in the Ecosystem
Methylmercury Bioaccumulation in Organisms

Mercury Spill Clean-up

- Detailed procedures in OPNAVINST 5100.19E, Appendix B3-B
  - Broken fluorescent bulbs
  - Small spills (3/4 teaspoon or size of a quarter or less)
  - Large spills (more than 3/4 teaspoon or size of a quarter)
- HgX® mercury decontaminant is needed for all spills – is your ship's HAZMAT Spill Response Kit complete?
- All cleanup material placed in impermeable containers and treated as HAZMAT

Polychlorinated Biphenyls (PCBs)

- Manmade
- Extremely Stable
  - Non-conductive
  - Low Vapor Pressure
  - Low Flammability
  - High Heat Capacity



PCB Concerns

- **PCBs are nonflammable liquids, however, exposure in a fire results in formation of black soot containing tetrachloro-dibenzo-p-dioxin (TCDD)**

PCBs → Fire → TCDD

PCB / TCDD Hazards

- **Possible Carcinogen**
  - **Can be absorbed through skin**
  - **Inhalation hazard**
- **Has caused chloracne (a skin rash), gastrointestinal disturbances, numbness of extremities**

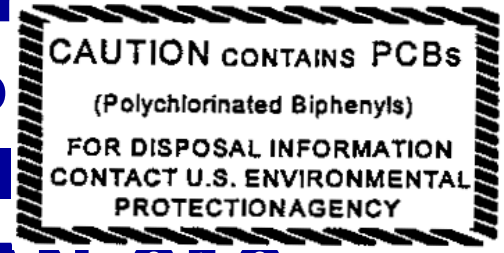
Use of PCBs Afloat

- **Pre – 1980 electronics**
  - **Capacitors / Transformers**
- **Felt & rubber materials**
  - **Ventilation systems – flange gaskets**
  - **Sound dampening on reduction gear casings**
  - **Machinery mountings**
  - **Electrical cable insulation**

PCBs Afloat

I'm Going to a Pre-1980 Ship. Now what?

- **Identify Potential PCB Components**
  - **IH Survey, Tech Pubs, Base Environmental**
- **Designate a spill coordinator**
  - **Inspect and Inventory Electro**
  - **Label Electronics (if applicabl**
- **Follow NAVSEA S9593-A1-MAN-010**
  - **Special Spill Response, PPE and Training**
- **Properly dispose of PCB containing equipment**
  - **40 CFR 761**



Equipment Labels

CAUTION

CONTAINS

PCBs

(Polychlorinated Biphenyls)

A toxic environmental contaminant requiring special handling and disposal in accordance with U.S. Environmental Protection Agency Regulations 40 CFR 761-For Disposal Information contact the nearest U.S. E.P.A. Office.

In case of accident or spill, call toll free the U.S. Coast Guard National Response Center: 800:424-8802

Also Contact: _____

Tel. No.: _____

Post 1980 PCBs

- **Possible PCBs in ventilation gasket material**
- **Assume your ship Has PCBs Except**
  - **CG, LHD, DDG, PC, CVN 71+**
- **Ventilation PMS (NAVSSES 151245Z Jan 92)**
  - **No hot work within 12” of flanges**
  - **Cover all vent openings while cleaning (No cheesecloth)**
  - **PPE (gloves, respirators, goggles, disposable coveralls)**
  - **Label all contaminated equipment as waste**
  - **Follow MRC and NAVSEA Advisories 94-1 and 94-2**

Lithium Batteries

- High energy density
- Long shelf life
- Durable
- Good temperature range

Common Navy Uses

- Night vision equipment
- Emergency radios (PRC 90/112)
- Water-activated electron
- Sonobouys
- Portable rangefinders
- Handheld GPS

Hazards

- **Explosion**
  - **Result of short circu**
  - **Violent venting**
- **Venting**
  - **Toxic materials rele**
  - **Lithium Sulfide + H_20 = Sulfuric Acid**
- **Fire**
  - **Class Delta**
  - **Class D or Lith-X extinguisher**

Safe Handling

- Store in original boxes
- Keep away from metal surfaces
- Cool, dry, well – ventilated, labeled locker (<130F on weather deck if possible)
- Inspect locker for corrosion
- Dispose of ashore as HM

Lead Facts

- Lead exposure can harm young children and babies even before they are born
- Even children who seem healthy can have high levels of lead in their bodies
- In most cases, lead-based paint that is in good condition is not a hazard

History of Lead

- Traced to Asia Minor 6,000 years ago
- Egyptians used lead in their tools
- Romans sweetened wine and cider with it

Loss of Franklin Expedition

- Sir John Franklin

North-West passage

Used canned food

soldered with lead

- All were lost.

Where is it used today?

- Battery Manufacturing (60%)
- Pigments (13%)
- Solders
- Plastics
- Stabilizers
- Ammunition (27%)

Shipboard Lead Sources

- Paint
- Solders
- Greases
- Small arms and ammunition

How Does Pb Get In People?

- Inhalation
  - Contaminated dust
  - Smoking
- Ingestion
  - Dirty hands
  - Contaminated food / drink
  - Applying cosmetics
- Poor work practices
- Poor housekeeping
- Poor hygiene

What's Wrong With Lead?

- Nervous system damage
- Interruption of red blood cell production
- Kidney damage
- Endocrine system damage
- Reproductive hazard in both males and females
- Child developmental concerns
- Body stores lead in bones
- Excretes it very slowly – half life 20 years

Responsibilities

- **Khaki / LPOs**
  - **Know your Sailors' jobs**
  - **Provide appropriate PPE and training**
- **Safety Officer**
  - **Identify hazards**
  - **Evaluate program**
  - **Follow procedures**

Control Measures

- **Substitution**
  - Only use paints in the stock system
  - Watch out for overseas “good deals”
- **IH Survey Report**
  - List of potential “lead jobs”
  - Type of PPE needed
  - Medical surveillance requirements
  - New job requires new evaluation

General Controls

- **Limit dust / fume generation**
  - **Don’t remove paint only for excessive thickness**
  - **Don’t burn paint**
  - **Needle gun vice grind**
  - **Use wet method when practical**
  - **Never blow down dust**
  - **Use HEPA vacuum**
- **Warn of potential hazard**
  - **Post signs**
  - **Bag and label waste materials**

Typical Lead Paint Removal Job

Training

- **Personnel exposed (and their supervisors)**
- **Initial and annual**
  - **Potential for exposure**
  - **Required PPE**
  - **Health effects**
  - **Medical surveillance**
  - **Proper workplace controls**
  - **Waste disposal procedures for debris**

Other Shipboard Paint Hazards

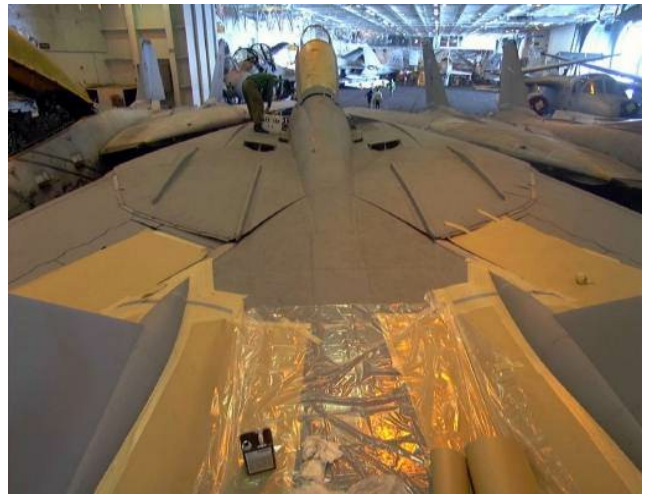
- Cadmium
- Polyurethane paint
- Crystalline silicon dioxide

Cadmium

- **Major uses: electroplating, pigments, plastics, batteries, brazing solder**
- **Health effects:**
  - **Acute – respiratory irritation & damage**
  - **Chronic – kidneys and respiratory system**

Polyurethane Paint

- Two-part aerospace coatings
- Poly isocyanates
- HDI / TDI / MDI
- Skin irritation / contact
- Occupational asthma
- Sensitization / allergic reactions
- TLV 0.005 ppm



Crystalline SiO_2

- Silica - quartz - sand
  - Found in nonskid
- Silicosis - progressive scarring of lung tissue
- Makes more susceptible

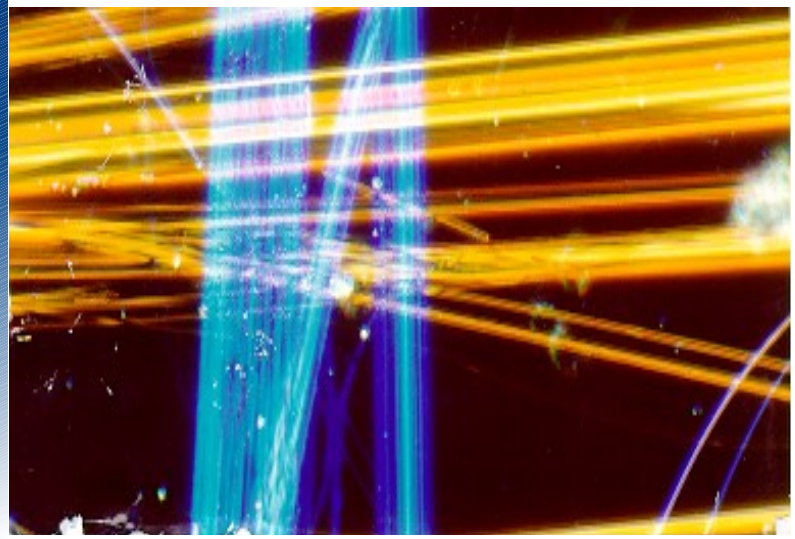
Paint Environmental Protection

- Air
  - If you can see it, you are in violation
- Water
  - Zero discharge
- Waste Disposal
  - Bag and label
  - Dispose through PWC

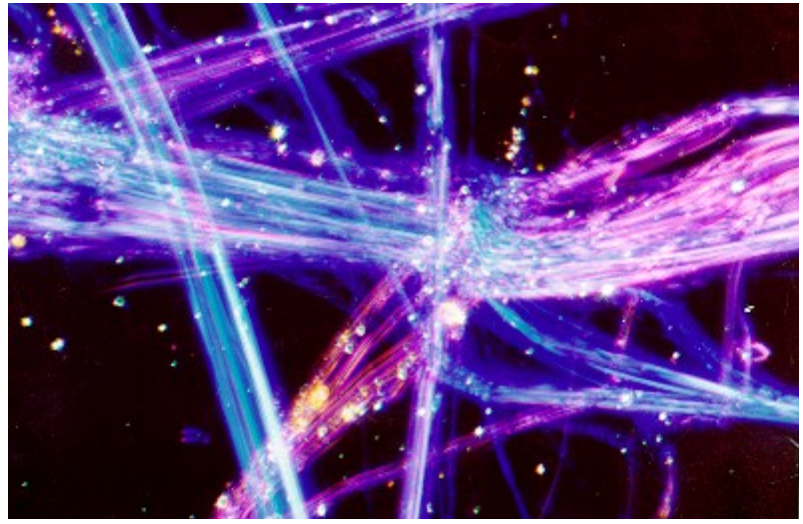
What is Asbestos?

- Group of natural minerals
  - Chrysotile – white (95% of asbestos in U.S.)
  - Amosite – brown
  - Crocidolite – blue
- Fire and acid resistant
- Strong, flexible, cheap

Asbestos Under the Scope



Amosite



Chrysotile

Shipboard Asbestos Use History

- Prior to 1971 – Extensive usage of asbestos containing products
- 1971 – 1973 – Reduced / low asbestos lagging
- 1974 – Asbestos free lagging mandated by NAVSEA – Pipe hanger liners excluded
- Since 1978 – All pipe hangers made asbestos free

Asbestos Health Hazards

- Exposure can cause:
  - Asbestosis
  - Lung cancer
  - Mesothelioma
- Smokers who are exposed:
  - 9x greater risk

Friable Asbestos

- **Material that can be crumbled, pulverized or reduced to a powder under hand pressure**
  - **Pipe lagging, acoustical insulation, sheet gas**
- **This is the ficant health hazard**

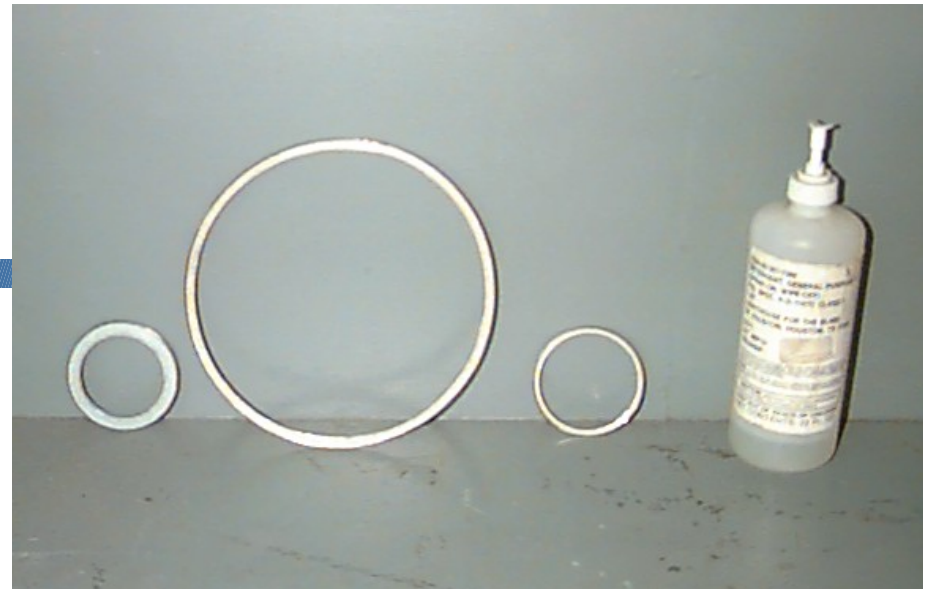
Non-friable Asbestos

- ACM that, when dry, cannot be crumbled, pulverized or reduced to a powder under hand pressure
  - Brake and clutch linings, gaskets, floor tile, adhesives
- Fibers cannot be readily released into the air under normal work conditions

Asbestos containing materials (ACM)

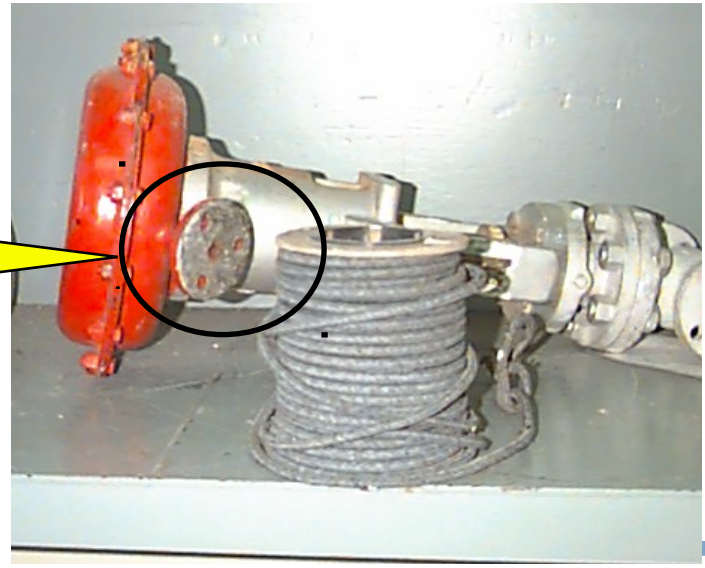
- Packing cord
- Gaskets
- Brake pads
- Clutch / brake linings
- Floor tile
- Sound dampening tiles
- Wire insulation
- Mastic / caulking compounds
- Fire proof gloves
- Fire hose webbing
- Thermal system insulation (TSI)

Have You Seen These Lately?



Gasket Sheets

Metal/Asbestos Gaske
> 35 NSN types



Packing Cord
> 83 NSN typ

Does My Ship Have Asbestos Lagging?

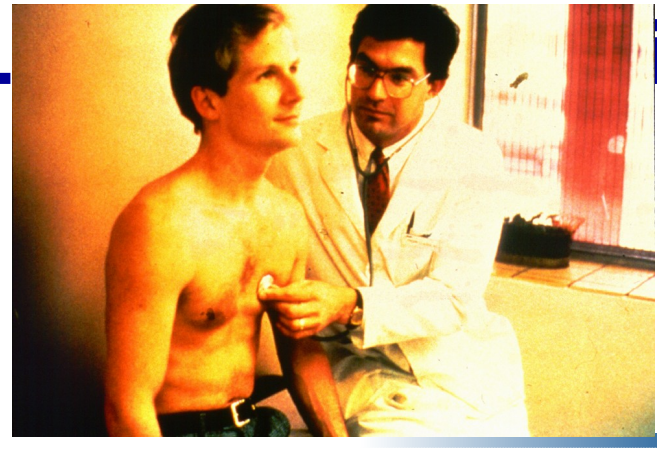
- Any ship whose keel was laid prior to 1980 considered to contain friable asbestos thermal system insulation (TSI)
- Older than 1980 must therefore maintain an EART (Emergency Asbestos Response Team)

Identification Information

- All thermal insulation on ships built prior to 1980 handled as if it contains asbestos
- Microscopic test – only way to determine if material contains asbestos
  - CV/CVN or tender
  - NEPMU
  - BUMED IH Office
  - Shipyard safety office
- DO NOT rely on special marking systems to identify asbestos-free insulation

Prior Unprotected Exposures

- Asbestos Medical Surveillance Program (AMSP)
- Every ship's concern
- Documented previous exposures
- Exposures to visible dust > 30 Days/Year
- OPNAV 5100/1[illegible]ire
- Program QA



Preventing Exposure

- Identification of asbestos hazards
- Limit exposure potential (substitution, engineering and administrative controls, PPE)
  - ALARA - As Low As Reasonably Achievable
  - Store asbestos material and waste properly
  - Training
  - Goal - Keep exposures below PEL (0.1 f/cc)

Non-Friable Asbestos Maintenance

- Protocol applies to ALL Navy ships
- Ship's force may replace ACM gaskets, packing material, brake and clutch assemblies, limited floor tile removal (9 sq ft max)
- Safety officer verifies training
- Store and dispose of material/waste appropriately

EART Protocols

- Keel laid prior to 1980
- Small scale (<3 linear ft pipe insulation or 1 sq ft other insulation), short duration
- Three person team (A-760-2166 grads)
- PPE [illegible], glov[illegible] resp[illegible], gogg[illegible]
- Bag[illegible]bel fo[illegible]osal

Common INSURV Hits

- Program not established
- Insufficient PPE onboard
- Safety officer not involved in program
- Required training not conducted

Safety Officer Tips

- Asbestos hazards exist on all ships – know where your ship's asbestos is
- Evaluate your program
- Inspect operations, approve access, verify PPE
- If in doubt, seek assistance!

Any Questions?